APR 19 2002

Mr. James L. Bacon
Department of the Army
Program Manager for Chemical Demilitarization
Aberdeen Proving Ground, MD 21010-5401

Dear Mr. Bacon:

The National Program Chemicals Division (NPCD) of the Environmental Protection Agency (EPA) grants the U.S. Army Program Manager for Chemical Demilitarization, Aberdeen Proving Ground, Maryland (PMCD) approval to initiate PCB Disposal operations exclusively at the Tooele Chemical Agent Disposal Facility (TOCDF) located at the South Area of the Tooele Army Depot, Tooele, Utah, for startup and shakedown operations and to perform the TSCA PCB Disposal Demonstration Test Burn on M55 Rockets containing nerve agent VX. The demonstration tests shall be performed at the Deactivation Furnace System of the TOCDF. NPCD has reviewed the Demonstration Test Plan and the Operating Permit Applications dated July 1993 and subsequent submissions, and has determined that the information contained in the documents is acceptable for initiation of PCB Disposal Demonstration Test Burn and that the tests will pose no unreasonable risk of injury to health and the environment. This approval is not a final approval for operation of this facility.

Enclosed is a document entitled "Approval to Dispose of Polychlorinated Biphenyls (PCBs) in the Deactivation Furnace of the Chemical Agent Disposal System," for the TSCA Demonstration Test Burn (Enclosure) for purposes of conducting the demonstration test burn on no more than two thousand (2,000) M55 rockets. Effective dates for this approval are from May 1, 2002 through December 31, 2002.

As part of the program to complete the disposal of chemical weapons stockpile at TOCDF, the Army needs to initiate startup and shakedown of the DFS with the processing of chemical weapons containing the nerve agent VX. At the end of the shakedown, the Army intends to perform the VX Agent Demonstration Test Burn on a limited number of M55 Rockets.

Regarding interim operations (i.e., operations after the test burn), TOCDF has indicated that the Demonstration Test Burn Report would require fifteen weeks to prepare for submission after completion of the Demonstration Test Burn. During those fifteen weeks of interim operations, EPA believes that all remaining M55 VX nerve agent rockets containing PCBs at the Deseret Storage Depot would be disposed of in TOCDF. By this letter, NPCD grants approval for five calendar weeks of interim operations (Phase 1) after the completion of an operationally

CONCURRENCES								
SYMBOL	7404	7401	7404					
SURNAME	Dodohara	KLNC	Bacon					
DATE	4/17/02	APR 19 2002	4/17/02					

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

APR 19 2002

OFFICE OF
PREVENTION, PESTICIDES AND
TOXIC SUBSTANCES

Mr. James L. Bacon
Department of the Army
Program Manager for Chemical Demilitarization
Aberdeen Proving Ground, MD 21010-5401

Dear Mr. Bacon:

The National Program Chemicals Division (NPCD) of the Environmental Protection Agency (EPA) grants the U.S. Army Program Manager for Chemical Demilitarization, Aberdeen Proving Ground, Maryland (PMCD) approval to initiate PCB Disposal operations exclusively at the Tooele Chemical Agent Disposal Facility (TOCDF) located at the South Area of the Tooele Army Depot, Tooele, Utah, for startup and shakedown operations and to perform the TSCA PCB Disposal Demonstration Test Burn on M55 Rockets containing nerve agent VX. The demonstration tests shall be performed at the Deactivation Furnace System of the TOCDF. NPCD has reviewed the Demonstration Test Plan and the Operating Permit Applications dated July 1993 and subsequent submissions, and has determined that the information contained in the documents is acceptable for initiation of PCB Disposal Demonstration Test Burn and that the tests will pose no unreasonable risk of injury to health and the environment. This approval is not a final approval for operation of this facility.

Enclosed is a document entitled "Approval to Dispose of Polychlorinated Biphenyls (PCBs) in the Deactivation Furnace of the Chemical Agent Disposal System," for the TSCA Demonstration Test Burn (Enclosure) for purposes of conducting the demonstration test burn on no more than two thousand (2,000) M55 rockets. Effective dates for this approval are from May 1, 2002 through December 31, 2002.

As part of the program to complete the disposal of chemical weapons stockpile at TOCDF, the Army needs to initiate startup and shakedown of the DFS with the processing of chemical weapons containing the nerve agent VX. At the end of the shakedown, the Army intends to perform the VX Agent Demonstration Test Burn on a limited number of M55 Rockets.

Regarding interim operations (i.e., operations after the test burn), TOCDF has indicated that the Demonstration Test Burn Report would require fifteen weeks to prepare for submission after completion of the Demonstration Test Burn. During those fifteen weeks of interim operations, EPA believes that all remaining M55 VX nerve agent rockets containing PCBs at the Deseret Storage Depot would be disposed of in TOCDF. By this letter, NPCD grants approval for five calendar weeks of interim operations (Phase 1) after the completion of an operationally

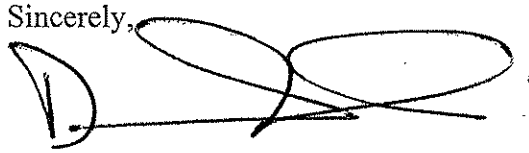
successful VX Rocket PCB Disposal Demonstration. Approval for this phase of the Interim Operations Approval is issued based on the data submission for the 1998 Trial Burn. EPA may approve an additional ten calendar weeks of interim operations (Phase 2) if all requirements of Condition 9 of this approval are met. Complete submissions, as determined by NPCD, from the Demonstration Test Burn shall be received by EPA at least ten calendar days prior to the start of the ten calendar week extension of Interim Operations.

A destruction and removal efficiency (DRE) of 99.9999% is a requisite for approval of a TSCA operating permit. To calculate DRE for the tests, the Army must add all PCB values quantified as well as estimating values for PCBs below the practical limit of quantitation (PLQ). Those PCB homologues (levels of chlorination) which have no congeners detected equal to or greater than the PLQ must be estimated to be present at the PLQ concentration.

As part of the PCB sampling and monitoring procedures, NPCD is adding the requirement to analyze for three coplanar and seven mono-ortho co-planar PCB congeners. NPCD requires the Army to analyze stack samples for these ten congeners, which are listed in Condition 7 of the attached approval. For purposes of the DRE calculations, these ten congeners shall be measured and quantified just as the other PCB congeners are, and included as part of their respective homologues and total PCBs. For purposes of the calculation of the total 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) equivalents, quantities of these ten congeners equal to or above the PLQ must be multiplied by the toxicity equivalency factors (TEFs) listed in Condition 7, and added to the total TCDD equivalents. When these congeners are in homologues (levels of chlorination) which have no congeners detected equal to or greater than the PLQ, each congener must be estimated to be present at the PLQ concentration for their respective homologues, multiplied by the applicable TEF5, and then included in the TCDD equivalent total.

If further assistance is needed on technical issues, please contact Hiroshi Dodohara at (202) 260-3959.

Sincerely,



David J. Kling, Acting Deputy Director
Office of Pollution Prevention and Toxics

Enclosure

cc: EPA Regional Administrator
Regions I - X

EPA Regional PCB Coordinator
Regions I - X

OPB Files (3)

Enclosure

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Approval to Dispose of Polychlorinated Biphenyls (PCBs)
in the Deactivation Furnace
of the Tooele Chemical Agent Disposal Facility

COMPANY

1. Tooele Chemical Agent Disposal Facility (TOCDF)
   Tooele Army Depot
   Tooele, Utah

2. Army Office of the Program Manager
   for Chemical Munitions Disposal
   Aberdeen Proving Ground, Maryland

3. EG&G Defense Materials, Inc.
   TOCDF Office
   Tooele, Utah

APPROVAL TYPE

PCB Demonstration Test Burn for M55 VX Agent Rockets

EFFECTIVE DATE

May 1, 2002 - December 31, 2002

AUTHORITY

This approval to perform a Toxic Substances Control Act Demonstration Test Burn for PCB disposal (hereafter referred to as Demonstration Test Burn) is issued pursuant to Section 6(e) (1)of the Toxic Substances Control Act of 1976, Public Law No. 94-469, and the Federal PCB Regulations, 40 CFR Part 761.60(e), (48 Federal Register, 13185, March 30, 1983)

CONDITIONS OF APPROVAL

1. Advance Notification: A thirty-day advance notice of the Demonstration Test Burn must be provided to the Regional Administrator of EPA Region VIII and State and local officials where the TOCDF process will be operated. This notice must include the exact site, dates and description of operation of the TOCDF process along with an estimate of the duration of testing at the site.

2 . Other Permits or Approvals: Prior to commencing the Demonstration Test Burn, the Army must obtain any necessary Federal, State or local permits or approvals. During the course of the Demonstration Test Burn, the Army shall comply with all conditions and requirements of such permits or approvals.

3. Feedstock Restrictions: During the Demonstration Test Burn period, the TOCDF DFS thermal treatment process may be used by the Army to deactivate no more than 2,000 PCB-contaminated rockets, each of which may contain more than 50 mg/kg PCBs.

4. Feedstock Characterization: The Army has sampled rockets from the stockpile of M55 rockets to characterize the feedstock. The average concentration of 1,247 ppm PCBs analyzed recently from a number of rockets may be used to calculate the total PCB feed and the destruction and removal efficiency (DRE) of PCBs in the TOCDF DFS. In accordance with EPA-disposal procedures outlined in the following documents, gas chromatography must be used to determine the concentration of PCBs:

"Guidelines for PCB Destruction Permit Applications and Demonstration Test Plans", EPA Contract No. 68-02-3938, April 16, 1985;

"Quality Assurance and Quality Control Procedures for Demonstrating PCB Destruction in Filing for an EPA Disposal Permit", USEPA, June 28, 1983 (Draft);

"Recommended Analytical Requirements for PCB Data Generated on Site During PCB Destruction Tests", December 12, 1985 (Draft); and

"Interim Guidelines and Specifications for Preparing Quality Assurance Plans", QAMS-005-/80, Office of Research and Development, USEPA, December 29, .1980.

Authorized EPA representatives must witness this Demonstration Test Burn and obtain appropriate split samples for verification of analytical results. The Army may conduct whatever additional analyses are necessary to characterize the waste feed and facilitate more efficient incineration, i.e., chloride content, ash content and heat of combustion.

The Army may dilute existing PCBs in the waste feed or add PCBs to the waste feed in o0rder to achieve an appropriate PCB concentration for demonstration purposes.

5. EPA Laboratory Audit: EPA may provide samples of PCB5 in test matrices, such as XAD4, in order to test the adequacy of analytical methods employed by the Army or its agent. EPA will inform the Army of the approximate range of PCB concentrations and the identity of the test matrix, if such samples are provided. The Army or its agent must determine the concentration of 0PCBs, polychlorinated dibenzo-p-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs) in the test materials collected during the regular Demonstration Test Burn period, and provide EPA with all chromatograms, calculations, and records regarding the analysis. EPA personnel may observe all or any portion of the analysis procedures.

6. Process Waste Characterization: All wastes generated by the TOCDF DFS including those from the Explosives Containment Room (ECR) must be characterized. Included in the list of wastes must be the following: stack emissions, cyclone particulates, Retort discharge (bottom ash), carbon filter media from the ECR, venturi scrubber water, and packed bed scrubber water (including solids from waste water concentrator/dryer) . As a minimum, all TOCDF DFS wastes must be analyzed for PCBs, PCDDs, and PCDFs. PCDD and PCDF analytical results must include the values for the 2,3,7,8-tetrachlorinated dibenzo-p-dioxin and 2,3,7, 8-tetrachlorinated dibenzofurans congeners; total tetrachlorinated dibenzo-p-dioxins and tetrachlorinated dibenzofurans; total pentachlorinated dibenzo-p-dioxins and pentachlorinated dibenzofurans; total hexachlorinated dibenzo-p-dioxins and hexachlorinated dibenzofurans; total heptachlorinated dibenzo-p-dioxins and heptachlorinated dibenzofurans; and total polychlorinated dibenzo-p-dioxins and total polychlorinated dibenzofurans.

A. The cyclone particulates, Retort discharge (bottom ash), scrubber waters, in addition, be sampled for the following parameters:

- chemical agent
- lead, cadmium
- Toxicity Characteristic Leaching Procedure (TCLP) test for heavy metals from solid wastes generated, and for the scrubber water from the Pollution Abatement System
- total dissolved solids for the scrubber water

B. In addition, solid wastes generated in the cyclone must be characterized for the following parameters:

- trinitrotoluene (TNT) and dinitrotoluene (DNT):
  "total TNT": 2,4,6-; 3,4,6-; 3,4,5-TNT
  "total DNT": 2,4-; 2,3-;3,4-;2,5-;2,6-;3,5-DNT
- RDX (cyclotrimethylenetrinitramine)
- HMX (cyclotetramethylenetetranitramine)
- nitroglycerin

C. The TOCDF workplace air filter media must be monitored for chemical agent components.

7. Stack Emissions Monitoring: Stack emissions must be monitored for the following parameters:

- O_2, oxygen, continuous
- CO, carbon monoxide, continuous
- CO_2, carbon dioxide
- NO_x, nitrogen oxides
- HC1, hydrogen chloride
- RCl, total chlorinated hydrocarbon

- Total Particulate Matter
- PCBs, polychlorinated biphenyls
- Tetrachlorinated Dibenzo-p-dioxins
- Tetrachlorinated Dibenzofurans
- 2,3,7, 8-Tetrachlorinated Dibenzo-p-dioxins
- 2, 3, 7, 8 -Tetrachlorinated Dibenzofurans
- total pentachlorinated dibenzo-p-dioxins
- total pentachlorinated dibenzofurans
- total hexachlorinated dibenzo-p-dioxins
- total hexachlorinated dibenzofurans
- total heptachlorinated dibenzo-p-dioxins
- total heptachlorinated dibenzofurans
- total polychlorinated dibenzo-p-dioxins
- total polychlorinated dibenzofurans

The PCB analysis must include the three co-planar and seven mono-ortho co-planar PCBs listed below, along with their respective 2,3,7,8 - Tetrachlorodibenzo-p-dioxin Toxic Equivalent Factors (TEF):

PCB Congener No.	PCB Congener Chemical Designation	TEF
77	3,4,3' , 4' -tetrachlorobiphenyl	0.0005
105	2, 3, 3' , 4, 4' -pentachlorobiphenyl	0.0001
114	2,3,4,4' .5 -pentachlorobiphenyl	0.0005
118	2,3' ,4,4' , 5-pentachlorobiphenyl	0.0001
126	3,4,5,3' ,4' -pentachlorobiphenyl	0.10
156	2,3,3' ,4,4' , 5-hexachlorobiphenyl	0.0005
157	2,3,3' ,4, 4' , 5' -hexachlorobiphenyl	0.0005
167	2,3' ,4,4' ,5,5' -hexachlorobiphenyl	0.00001
169	3,4,5,3' ,4 '5' -hexachlorobiphenyl	0.01
189	2,3,3' ,4,4' ,5,5' -heptachlorobiphenyl	0.0001

DRE Calculation: Co-planar PCB congeners are counted in the total homologue (level of chlorination) count with all of the other congeners in the same homologue. They are not double counted in the DRE calculation.

Calculation of TCDD Equivalents: 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) equivalents shall be calculated for purposes of risk assessment and combustion strategy requirements. PCB congeners which are not on the list above, do not have to be included in the calculation of TCDD equivalents. A TCDD equivalent is the product of the concentration of a congener and the toxicity equivalency factor (TEF) assigned to that congener. The coplanar PCB concentrations shall be multiplied by the assigned TEFs to obtain the TCDD equivalents for the co-planar PCB congeners on the list. The resulting TCDD equivalents from PCBs will be added to the TCDD equivalents calculated from

chlorinated dibenzofurans and from chlorinated dibenzo-p-dioxins to report the total TCDD equivalents from the stack emissions. In the event that co-planar and/or mono-ortho co-planar PCB concentrations are not directly calculated, the measured concentration of most abundant congener in the homologue shall be used for the concentration to be included in the TCDD equivalent calculation. Similarly, in the event that no congener is measured in a homologue above the practical limit of quantitation (PLQ), the PLQ shall be used as the concentration for each applicable co-planar and/or mono-ortho co-planar congener in the TCDD equivalent calculation.

8. Successful Trial Runs: To satisfy the provisions of paragraphs 5 and 6, a minimum of three successful trial runs must be completed. Successful trial run is defined as one in which operations were continuous for a minimum of four hours without significant interruptions (i.e. the test has been completed on the same day initiated and the samples have been preserved and maintained intact), and one in which sampling of the stack was representative and adequate to achieve evaluation of PCB DRE to the 99.9999% level.

To calculate PCB DRE, the Army must add all PCB values quantified as well as all values detected but not quantifiable. Those values detected but not practicably quantifiable must be estimated. The maximum level estimated value shall be used. PCB levels below the detection limit shall be treated as zero values. Sampling blank values shall not be subtracted from emission values to quantify emission rates.

9. Interim Operations:

Due to the overall acute toxicits of the waste being disposed of, EPA may allow interim operations of TOCDF before any final administrative action on the draft disposal approval. TOCDF may continue operations after successfully completing the PCB Disposal Demonstration Tests at a feed rate equal to the average feed rate established during the VX Demonstration Trial Burn. To grant interim operation authorization, EPA must determine that the TOCDF DFS poses no unreasonable risk of injury to health or the environment, i.e., that it complies with the TSCA PCB incinerator standards as defined in 40 CFR 761.70.

1. For each run in the Demonstration Test Burn, the data shall demonstrate a minimum DRE for PCBs of 99.9999% and a maximum TEQ of 0.2 nanograms per dry standard cubic meter of emissions, adjusted to 7% excess oxygen.

2. The NPCD quality assurance check sample results shall report the spiked compounds within the precision and accuracy requirements stated in the procedures used for PCB analysis (modified Method 1668).

TOCDF is authorized to proceed with Phase 1, the initial five weeks of the interim operations, based on performance results submitted for the 1998 GB M55 Rocket Demonstration Trial Burn. The 1998 Trial Burn demonstrated that the GB M55 Rocket disposal operations complied with the PCB incinerator standards.

To proceed to Phase 2 requires that the DFS meets the 99.9999% destruction and removal efficiency (DRE) standards during the VX Rocket Demonstration Test Burn. In addition, TOCDF must provide for EPA acceptance, PCDD/PCDF emission data. The exhaust gas may not exceed 0.2 ng/m^3 TEQ of 2,3,7,8 tetrachlorodibenzodioxin concentration, adjusted to 7% O_2. The acceptance of the required data and authorization to proceed to Phase 2 will be verbal, followed by written confirmation by the Chief, Fibers and Organics Branch (FOB), NPCD. In addition, TOCDF must submit the following data:

1. All PCB analytical data needed to calculate the DRE.

2. All coplanar PCB analytical data, polychlorinated dibenzofurans analytical data, and all polychlorinated dibenzo-p-dioxin analytical data needed to calculate total 2,3,7, 8-tetrachlorodibenzo-p-dioxin equivalents (TEQ).

If TOCDF demonstrates that the parameters meet the criteria, then EPA will authorize verbally followed by written confirmation, an additional period of operation not to exceed five weeks. The approval shall be signed by the Chief, FOB, NPCD authorizing up to five additional weeks of interim operations.

The interim operations procedure is summarized below.

Phase	Parameters	Criteria	Authorized Duration of Interim Operations After Completion of Demonstration Tests	Cumulative Total Weeks of Interim Operations
(1)	PCB Incinerator Standards	40CFR 761.70	five weeks	five week
(2)	PCB Incineration DRE	99.9999% DRE	ten weeks	fifteen weeks
	PCDD TEF emissions	< 0.2 ng/m^3		

EPA may approve any additional time necessary to dispose of any remaining M-55 rockets containing VX nerve agent if a complete Demonstration Test Report, as determined by NPCD, is received by EPA and the report verifies an operationally successful Demonstration Test Burn.

10. Process Waste Handling and Disposal: The Army, as standard operating procedure, shall dispose of all solid waste generated during the Demonstration Test Burn from the TOCDF DFS in EPA-approved chemical waste landfills, pursuant to 40 CFR 761.75 unless verified by EPA to contain PCBs at less than 2 ppm; and water discharges shall be incinerated in EPA-approved PCB incinerators unless it can be shown that the discharge contains no detectable PCBs (for this purpose, 3 ppb) or that the discharge is controlled under an existing National Pollutant Discharge Elimination System (NPDES) permit.

11. Process Waste Disposal: All wastes generated by the TOCDF DFS process (filter media, sludge, solvent or other effluent, etc.), which have been found to contain 2 ppm or more PCBs, as calculated by comparison to an external standard homolog peak having the nearest retention time

to each appropriate PCB peak to be quantified, must be disposed of in a PCB disposal facility approved by EPA under 40 CFR Part 761.60. Analytical methods specified in the application for PCBs in different phases (water, solids and oil) must be used by the Army in making such determinations.

12. Process Restrictions: The TOCDF DFS shall operate at the following conditions whenever PCB5 are being incinerated:

A. The residence time for the afterburner combustion zone shall be a minimum two seconds, and the operating temperature shall be a minimum of 2000° F;

The dwell time of material in the Kiln Retort will be determined by the revolution of the kiln within a range from 0.5 to 2.0 rpm;

B. The stack excess oxygen shall be 3% minimum as measured in undiluted discharged combustion gas;

C. The combustion efficiency shall be a minimum of. 99.9%, computed as follows:

$$\text{combustion efficiency} = \frac{Cco_2}{Cco_2 + Cco} \text{ X } 100, \text{ where}$$

Cco_2 = concentration of carbon dioxide by volume; and
Cco = concentration of carbon monoxide by volume.

The combustion efficiency shall be recorded at least every 15 minutes from analytical data supplied from the monitoring requirements specified in Condition 6;

D. The particulate emission rate shall be less than 0.08 grains/dscf and the HC1 emissions shall be no greater than 4 lb/hr or if greater than 4 lb/hr, the removal rate shall be greater than 99%;

E. The rate and quantity of PCBs fed shall be measured and recorded at least every 15 minutes;

F The Kiln Retort and Afterburner combustion zones outlet temperature shall be continuously measured and recorded;

G Unless a contingency plan is submitted by the incinerator owner or operator and approved by the Director of the National Program Chemicals Division, and the contingency plan indicates what alternative measures the incinerator owner or operator will take if the flow of PCB feed material to the TOCDF DFS shall stop automatically, the flow of PCB feed material shall stop automatically when any one or more of the following conditions occur:

(i) Failure of the monitoring operations specified in Condition (7).

(ii) Failure of the PCB rate and quantity measuring and recording equipment estimated in Condition

(iii) Excess oxygen falls below 3% by volume;

(iv) Failure to achieve a minimum 99.9% combustion efficiency; and

(v) The incinerator outlet temperature drops below the temperature specified in Condition 11 (A).

13. Process Monitoring: Provisions must be made to assure that the following process elements are suitably monitored and recorded for each batch of PCB-contaminated M55 firing tubes processed:

A. Quantity and M55 rockets charged into the Deactivation Furnace System;

B. Quantity and PCB concentration in process waste generated (i.e., sludge, filter media, water, spent solvent or other effluent), including vent gases or other emissions;

C. Temperature and pressure of reaction in at least one half hour intervals;

D. Date, time and duration of run; and

E. Name of operator and supervisor.

13. Process Failure: If the quality control testing as described in the Demonstration Test Burn plan and the EPA guidelines reveals that the PCBs are not being adequately destroyed, disposal activities may be ordered by EPA representatives to cease until adequate explanation is given and corrective measures are taken. A written report detailing the problem and solution shall be filed with the EPA within five business days.

14. Expiration Dates: This approval shall expire on December 31, 2002.

15. Recordkeeping: The Army TOCDF shall collect and maintain for a period of five years from the date of the Demonstration Test Burn, the following information:

A. Continuous and short interval data described below:

(i) Rate and quantity of PCBs fed into the combustion system;

(ii) Temperature of the combustion operations; and

(iii) Stack emissions, including oxygen, carbon monoxide and carbon dioxide.

B. Data and records on the monitoring of stack emissions and combustion efficiency as required by these conditions;

C. The total weight in kilograms of any solid residues generated by the incineration of PCBs during the demonstration, and the total weight in kilograms of any solid residues disposed of by the facility and the location of the solids disposed;

D. The type and amount of PCB waste and other raw materials incinerated;

E. The location, manufacturer (if known), and serial number (if any) of any equipment from which PCBs were processed;

F. A copy of each gas chromatogram from the test required by Conditions 4 and 6;

G. The date(s), time and duration of the Demonstration Test Burn;

H. The name, address and telephone number of the operator and supervisor.

The documents must be compiled within 60 days following completion of the Demonstration Test Burn, must be kept at one centralized location, and must be available for inspection by authorized representatives of the EPA upon request. The Army TOCDF or its authorized agents must also maintain the records required by 40 CFR 761.180. If the Army TOCDF or its agents terminate business, these records or their copies must be submitted to the Director of the National Program Chemicals Division.

16. Safety and Health Standards: The Army TOCDF or its agents must take all necessary precautionary measures to ensure that operation of the TOCDF DFS unit is in compliance with the applicable safety and health standards, as required by Federal, State and local regulations and ordinances.

17. Facility Security: The TOCDF DFS unit shall be secured (e.g., fence, alarm system, etc.) at the test site to restrict public access to the area.

18. PCB Releases and Spills: Any spills of PCBs or other fluids shall be promptly contained and cleaned up. In addition, a written report describing the spill, operations involved, and cleanup actions must be submitted to EPA Region VIII within five (5) business days.

A written report describing the incident must be submitted by the close of business on the next regular business day. No PCBs may be processed in that facility until the release problem has been corrected to the satisfaction of EPA Region VIII.

19. Personnel Training: The Army is responsible for ensuring that personnel directly involved with t~e handling or disposal of PCB—contaminated material using the TOCDF DFS process are demonstrably familiar with the general requirements of this Demonstration Test Burn approval. At a minimum this must include:

A. The type of material which may be treated during the testing of the TOCDF DFS unit, and the upper limit of the PCB contamination which may be treated;

B. Basic reporting and recordkeeping requirements under this Demonstration Test Burn approval and the location of records at the test site;

C. Notification requirements; and

D. Waste disposal requirements for process and by-product wastes generated during the testing of the TOCDF DFS process.

In this regard, the Army must maintain the following documents on-site during the testing of its incinerator; (1) copy of this Demonstration Test Burn approval, (2) spill prevention and cleanup plan, and (3) the sampling plans to collect untreated and treated materials.

20. PCB Regulation Compliance: The Army shall comply with all applicable requirements of the Federal PCB Regulations, 40 CFR Part 761, in the operation of the TOCDF DFS unit. Particular notice should be given to:

A. 40 CFR, Section 761.65 - storage for disposal;
B. 40 CFR, Section 761.79 - decontamination; and
C. 40 CFR, Section 761.180 - records and monitoring.

21. Process Modifications: Any departure from the conditions of this Demonstration Test Burn approval or the terms expressed in the application and Demonstration Test Burn plan from the Army must receive authorization from the EPA. Verbal authorizations by EPA must be followed within ten working days by a written notification from the Army describing all modifications. In this context, "application and Demonstration Test Burn plan" shall be defined as all data and materials which have been received by this Agency from the U.S. Department of the Army regarding the TOCDF DFS destruction method.

22. Approval Modifications: EPA reserves the right to impose additional conditions when it has reason to believe that the continued operation of the TOCDF DFS decontamination/disposal process presents an unreasonable risk of injury to public health or the environment, or for any other valid cause.

23. Demonstration Test Burn Approval: Under the above conditions, and given the circumstances under which the Demonstration Test Burn will be conducted, the National Program Chemicals Division finds, pursuant to 40 CFR 761.60(e), that these tests will not present an unreasonable risk of injury to health or the environment.

Approval to perform the Demonstration Test Burn for PCB disposal is hereby granted to the Department of the Army, Tooele Chemical Agent Disposal Facility, Tooele Army Depot, Tooele, Utah; the Army Office of the Program Manager f or Chemical Demilitarization,

Aberdeen Proving Ground, Maryland and EG&G Defense Materials, Inc., TOCDF Office, Tooele, Utah subject to the conditions expressed herein, and consistent with the materials and data included in Army application "Preliminary Demonstration Test Plan, Permit Application, PCB Destruction Unit Incinerator for the Department of the Army, Tooele Army Depot, Chemical Agent Disposal Facility" July 1993., and subsequent submissions. This Demonstration Test Burn approval is valid when conducted at the Deactivation Furnace System in the TOCDF facility on the Tooele Army Depot, Tooele, Utah.

Date: 4/19/2002

David J. Kling, Acting Deputy Director
Office of Pollution Prevention and Toxics

APPENDIX I

BACKGROUND

TSCA Disposal

Section 6(e) (1) (A) of the Toxic Substances Control Act (TSCA) requires that EPA promulgate rules for the disposal of polychlorinated biphenyls (PCBs). The rules implementing section 6(e) (1) (A) were published in the Federal Register of May 31, 1979 (44 FR 31514) and recodified in the Federal Register of May 6, 1982 (47 FR 19527). Among other things, those rules require, among other things, that various types of PCBs and PCB Articles be disposed of in EPA-approved landfills (40 CFR 761.75), incinerators (40 CFR 761.70), high efficiency boilers (40 CFR 761.60), or by alternative methods (40 CFR 761.60(e)) that demonstrate a level of performance equivalent to EPA-approved incinerators or high~ efficiency boilers. The May 31, 1979 Federal Register also designated Regional Administrators as the approval authority for PCB disposal facilities.

On March 30, 1983, EPA issued a procedural rule amendment to the PCB rule (48 FR 13185). This procedural rule change transferred the review and approval authority of mobile and other PCB disposal facilities that are used in more than one region to the Office of Pesticides and Toxic Substances (OPTS). The purpose of the amendment is to eliminate duplication of effort in the regional offices and to unify the Agency's approach to PCB disposal. The amendment gives the Assistant Administrator authority to issue nationwide approvals (i.e., approvals which will be effective in all ten EPA regions) to mobile and other PCB disposal facilities that are used in more than one region. The Assistant Administrator delegated this approval authority to the Director of the Office of Pollution Prevention and Toxics (OPPT) on January 23, 1984. Approval authority has since been further delegated to the Director of the National Program Chemicals Division.

CHEMICAL AGENT DISPOSAL MANDATE

Under Congressional mandate, the Department of the Army must dispose of existing stocks of chemical warfare agent munitions. The Army intends to operate eight facilities throughout the country to dispose of chemical agents. PCBs have been found at concentrations regulated for disposal under TSCA within the M55 Agent Rocket shipping and firing tube assembly. Destruction of M55 Rocket components is performed in the Deactivation Furnace System (DFS). The DFS is one component of the demilitarization facility at the Tooele Chemical Agent Disposal Facility (TOCDF), for chemical munitions, storage containers, and the detoxification of nerve agents (GB and VX) and mustard agent (H and HD). TOCDF includes the DFS, the Dunnage Incinerator, the Liquid Incinerator (LIC) and the Metals Parts Furnace. The Army disposes of the M55 Rockets only in the DFS.

Congress enacted Public Law 100-456, September 29, 1988, National Defense Authorization Act, FY 1989, establishing the deadline of December 31, 1990 to complete the operations verification tests (OVT) at the Army Chemical Agent Disposal Systems in Johnston Atoll. In 1993, the Army completed the OVT at the Johnston Atoll Chemical Agent Disposal Systems (JACADS). The completion of the OVT at Johnston Atoll was pivotal because, by

Congressional Order, no chemical agent disposal activity may be conducted at any Army facility excepting Tooele, Utah, until the completion of the prove out effort at Johnston Atoll. The deadline for eliminating the chemical agent stockpile is December 31, 2004.

The Army submitted on July 1993, an application for TSCA PCB research and development approval (R&D) permit and an application and a Demonstration Test Burn plan for a nationwide TSCA permit to dispose of PCBs in M55 Rockets at the Tooele Chemical Disposal Facility (TOCDF). The TSCA R&D operations, the M55 GB Rockets Demonstration Test Burn, and the M55 GB Rocket disposal campaign have been completed. To complete the disposal of chemical weapons stockpile at TOCDF, the Army plans to initiate startup and shakedown of the DFS with the processing of chemical weapons containing the nerve agent VX. At the end of the shakedown, the Army intends to perform the VX Agent Demonstration Test Burn. Upon receipt of the TSCA PCB disposal approval, the Army intends to begin to the start phase to incinerate the remaining VX M55 rockets.

FINDINGS

1. In 1979, the U.S. Department of the Army initiated operations to destroy M55 rockets in the Deactivation Furnace System (DFS) of the Chemical Agent Munitions Disposal System (CAMDS) located in Tooele Army Depot, Tooele, Utah. In the fall of 1985, PCBs were identified in the firing and shipping (F/S) tubes which encase the M55 rockets.

The M55 Rocket F/S tubes consists of either chopped or matted fiberglass, depending on manufacturer, and weigh approximately 14 pounds each. The two types of tubes are readily discernable visually. Analytical results from a sample of 55 tubes revealed that the chopped variety consistently contained PCBs below 50 mg/kg (50 ppm). The matted type showed some results below 50 mg/kg PCBs; however, the majority of matted tubes contained PCBs above 2000 mg/kg with a high concentration of 4290 mg/kg. One matted tube had been painted, contained a level of 15,200 mg/kg PCB5 and was considered a statistical outlier and therefore not used by the Army in the calculation of PCB content.

Additional samples of the F/S tubes revealed that 3% of the 147 chopped tubes sampled contained PCB concentrations of over 50 ppm. The 1000 matted S/F tubes sampled exhibited a bimodal distribution with 47% of the matted tubes containing less than 50 ppm PCBs and 53% of the tubes containing PCBs concentrations of over 2700 ppm. The highest concentration of PCBs in the matted S/F tubes was found to be 5800 ppm. In 1987, the Army submitted results from a sampling program which characterized the PCB contamination of the universe of M55 shipping/firing (s/f) tubes. The s/f tubes generally possessed PCB levels in the 2000 to 4000 ppm region, averaging 2700 ppm. Analysis of samples collected recently indicate that the rocket tubes to be treated during R&D operations exhibit average levels of PCB5 of about 1,247 ppm.

2. The Deactivation Furnace System contains the Explosive Containment Room (ECR), the Retort, and the Pollution Abatement System (PAS) . Operators transport the rockets from storage, unpack and load them onto a conveyor leading to the ECR. Instruments control

operations in the ECR automatically. A punch unit pierces the rocket warheads draining and removing 95% of the chemical agent. Conveyors carry the rocket to a shearing apparatus, cutting the rocket into eight segments. The rocket pieces fall into the Retort through a sliding gate and then through a tipping valve. The sliding gate acts as a barrier to contain any deflagration or explosion. The rocket segments travel through the Retort countercurrent or opposite to flow of hot gases and exit through a heated discharge conveyor.

3. Combustion gases pass through a blast attenuation duct and flow into the Cyclone separating large particulates from the gas stream. The gases continue through a slagging afterburner and a quencher, and are then cleansed, using a venturi scrubber and a packed bed scrubber. Finally, the gases pass through a mist eliminator and discharge through the common stack.

4. The Retort is a rotary kiln with the burner located at the exit (rocket segment exit), rated at eight million BTU/hr. Fugitive emissions are controlled by operating the furnace under negative pressure. The kiln rotates at 0.5 to 2 rpm. The kiln retention time for solids is about 12 minutes, however, this varies with the rpm. The solids are heated for an additional 15 minutes in the heated discharge conveyor. The Retort and conveyor operate at a minimum temperature of 1000°F. Dimensions of the Retort are nominally 5-feet in diameter and 32 feet 10-1/2 inches long.

5. A sealed drum below the cyclone collects particulates, primarily fiberglass which flow past a gate discharge valve mechanism. The collected material is periodically analyzed for chemical agents.

6. The afterburner, with a retention time of two seconds minimum, operates at 2150°F. The quench tower reduces exhaust gases to less than 300°F while the venturi scrubber removes particulates. A single closed loop brine system serves both the quench tower and the venturi scrubber. A packed tower removes acidic gases while a controller unit in the closed loop system maintains brine pH at a level of about 8.

7. Details of the Deactivated Furnace System and the agent rockets have been filed with EPA Headquarters in Washington, D.C. in the application and Demonstration Test Burn plan for permit approval dated July 1993.

TOCDF DFS TSCA GB Demonstration Test Burn Results:

1. Rocket Feed Rate: The desired rate or set point for feeding the rockets into the DFS is 38 rockets per hour. For the three runs completed, the rocket feed rate averaged 32.5 rockets per hour.

2. Combustion Temperatures: At the burner or the solids discharge end of the Retort the average temperature was 1098.1°F. At the exhaust side of Afterburner, the average operating temperature was 2150°F.

3. Combustion Efficiency: The DFS met the combustion efficiency of 99.9% pursuant to

40 CFR 761.70(a)(2) for all the runs. The combustion efficiency average for the three runs was 99.99%.

4. PCB DREs: The destruction and removal efficiency (DRE) for Run 1, 2 and 3 were above the 99.9999% DRE required for PCBs at §761.70(b)(1).

5. Emissions: Stack sampling results indicate particulate emissions to be well below the existing standards of 180 mg/dscm (0.08 gr/dscf). The average for the three runs is 2.9 mg/dscm (0.0037 gr/dscf). Sampling for hydrogen chloride (HCl) indicate <0.0092 g/sec HCl in the stack gas. Other stack gas parameter averages were: (a) oxygen - 9.6%, (b) carbon monoxide - 6.0 ppm, and (c) carbon dioxide - 6.9%.

No PCDDs or PCDFs were detected in the stack samples and so the emission rate complied with the health risk assessment (HRA) level for all dioxin and furan homologues. Stack samples for energetic compounds indicated emission rate for nitroglycerin to be below the HRA level with the TNT emission rate averaging <5.3E-06 compared to the HRA level of 2.53E-06 lb/hr.

Products of incomplete combustion (PICs) include volatile and semi-volatile organic compounds. Fourteen volatile organic compounds were detected, including chlorinated and bromated compounds. Four of these compounds exceeded the HRA emission rates. Semi-volatile PICs detected in the stack gas were dimethyl phthalates, benzaldehyde, and acetophenone, however, the emission rates did not exceed the HRA emission levels for these compounds. For metals emissions, antimony, cadmium, lead, and mercury emission rates were above the HRA levels.

6. Afterburner Residence Time: The afterburner residence time for Runs 1, 2, and 3 were 3.1, 3.1, and 3.0 seconds, respectively.

7. Test Results Summary

SUMMARY OF TEST CONDITIONS AND RESULTS

Process Parameters	Units	FOB*	Test Runs No. 1	Test Runs No. 2	Test Runs No.3	Avg.	Require-ments	
DFS Temperatures	°F							
Retort Burner End (HDC Top)		1092	1098	1098	1099	1098.7	> 1000	
Afterburner Exhaust		2150	2150	2150	2150	2150	2200±150	
Combustion Efficiency	%	99.99	99.99	99.99	99.99	99.99	≥99.9	
PCBs DRE	%	NA	99.999987	99.999986	99.999984	99.999985	>99.9999	
Rocket Feed Rate Set Point	no./hr	NA	38	38	38	38		
Rocket Feed Rate	no./hr	NA	30.8	33.6	33.0	32.5		
Total Rockets Processed, Line A	rkts	NA	108	99	126			
Total Rockets Processed, Line B	rkts	NA	113	137	149			
PCB Feed Rate	kg/hr	NA	0.22	0.24	0.22			
PCB Stack Concentration	µg/dscm	0.0022	0.0020	0.0022	0.0025	0.0023		
PCB Emission Rate	gm/sec	8.2E-09	8.0E-09	8.9E-09	1.0E-08	8.97E-09	5.39E-07	(HRA)
GB Agent DRE	%	NA	99.9999975	99.9999972	99.9999977			
GB Feed Rate, Purity Corrected	lb/hr	NA	11.1	9.9	11.9			
GB Concentration	µg/m³	NA	<2.81E-03	<2.77E-03	<2.73E-03			
Particulate Conc., to 7% O_2	mg/dscm	3.0	2.4	3.8	2.4	2.9	<180	

SUMMARY OF TEST CONDITIONS AND RESULTS (cont'd)

Process Parameters	Units	FOB*	Test Runs No. 1	Test Runs No. 2	Test Runs No.3	Avg.	Require-ments	
Particulate Emission Rate	g/sec	0.0082	0.0074	0.0121	0.0082	0.0092	0.0174	(HRA)
HCl Emission	lb/hr	<0.0153	<0.0158	<0.0148	<0.0156	<0.015	<4	
HCl Emission	g/sec	<0.0019	<0.0020	<0.0019	<0.0020	<0.0020	<0.00115	(HRA)
Stack Gas Flow Rate	dscf/hr	462,780	474,240	495,660	532,620	500,840		
Oxygen	%	10.5	9.6	9.6	9.6	9.6		
Carbon dioxide	%	5.4	7.1	6.8	6.9	6.9		
Carbon Monoxide, to 7% O_2	ppm	5	6	6	6	6	<100	

*Fuel-Only Burn No. 2

PCB ANALYSIS

PCB Homologues/Congeners Per Sample

PCB, ng/sample	FOB Run	Run 1	Run 2	Run 3
Total Chlorobiphenyl		<1	<1	<1
Total Dichlorobiphenyl	2.9	1.2	3.2	4.6
Total Trichlorobiphenyl	<1	2.7	2.1	2.2
Total Tetrachlorobiphenyl	<1	<1	<1	<1
2,2',4,4'-Teterachlorobiphenyl	<1	<1	<1	<1
3,3',4,4'-Tetrachlorobiphenyl	<1	<1	<1	<1
Total Pentachlorobiphenyl	<1	<1	<1	<1
3,3',4,4',5-Pentachlorobiphenyl	<1	<1	<1	<1
Total Hexachlorobiphenyl	<1	<1	<1	<1
3,3',4,4',5,5'-Hexachlorobiphenyl	<1	<1	<1	<1
Total Heptachlorobiphenyl	<1	<1	<1	<1
Total Octochlorobipenyl	<1	<1	<1	<1
Total Nonochlorobiphenyl	<1	<1	<1	<1
Total Decachlorobiphenyl	<1	<1	<1	<1

DIOXIN/FURAN ANALYSIS

PCDD/PCDF, pg/sample	FOB Run	Run 1	Run 2	Run 3
PCDDs				
2,3,7,8-TCDD	<5.2	<5.8	<3.9	<4.1
Total TCDD	<8.2	<8.7	<8.6	<9.3
1,2,3,7,8-PeCDD	<6.0	<9.0	<5.5	<5.9
Total PeCDD	<14.0	<19	<20	<18
1,2,3,4,7,8-HxCDD	<6.3	<8.0	<6.1	<6.6
1,2,3,6,7,8-HxCDD	<5.5	<7.0	<6.1	<5.9
1,2,3,7,8,9-HxCDD	<5.6	<7.2	<5.3	<5.9
Total HxCDD	<6.3	<8.0	<5.5	<6.6
1,2,3,4,6,7,8-HpCDD	<4.8	<6.6	<4.5	<5.8
Total HpCDD	<4.8	<6.6	<4.5	<5.8
OCDD	<30	<21	<22	<20
Total PCDDs	<63	<63	<62	<59
PCDFs				
2,3,7,8-TCDF	<6.1	<6.5	<5.9	<6.6
Total TCDF	<6.1	<6.5	<5.9	<6.6
1,2,3,7,8-PeCDF	<4.3	<5.1	<4.2	<4.7
2,3,4,7,8-PeCDF	<4.4	<5.5	<4.2	<4.9
Total PeCDF	<4.4	<5.1	<4.2	<4.9
1,2,3,4,7,8-HxCDF	<2.9	<4.1	<3.2	<3.2
1,2,3,6,7,8-HxCDF	<2.9	<4.2	<3.3	<3.2
2,3,4,6,7,8-HxCDF	<3.2	<4.6	<3.6	<3.6

DIOXIN/FURAN ANALYSIS (cont'd)

PCDD/PCDF, pg/sample	FOB Run	Run 1	Run 2	Run 3
PCDFs				
1,2,3,7,8,9-HxCDF	<3.8	<5.5	<4.3	<4.2
Total HxCDF	<3.8	<5.5	<4.3	<4.2
1,2,3,4,6,7,8-HpCDF	<2.6	<2.5	<2.2	<2.6
1,2,3,4,6,7,8-HpCDF	<2.6	<2.8	<3.3	<3.7
Total HpCDF	<3.1	<3.1	<3.3	<3.7
OCDF	<6.1	<7.7	<7.6	<5.9
Total PCDFs	<24	<28	<25	<25

DIOXIN/FURAN EMISSION RATES, gm/sec

PCDDs	FOB Run	Run 1	Run2	Run 3	HRA Emission Rate
Total TCDD	<5.5E-12	<5.8E-12	<5.7E-12	<6.2E-12	5.27E-11
Total PeCDD	<9.4E-12	<1.3E-11	<1.3E-11	<1.2E-11	2.63E-10
Total HxCDD	<4.2E-12	<5.3E-12	<4.0E-12	<4.4E-12	7.19E-10
Total HpCDD	<3.2E-12	<4.4E-12	<3.0E-12	<3.8E-12	5.63E-10
OCDD	<2.0E-11	<1.4E-11	<1.5E-12	<1.3E-11	1.20E-09
PCDFs					
Total TCDF	<4.1E-12	<4.3E-12	<3.90E-12	4.4E-12	5.27E-11
Total PeCDF	<2.9E-12	<3.4E-12	<2.8E-11	<3.2E-12	5.39E-10
Total HxCDF	<2.5E-12	<3.6E-12	<2.8E-12	<2.8E-12	1.10E-09
Total HpCDF	<2.1E-12	<2.1E-12	<2.2E-12	<2.4E-12	6.35E-10
OCDF	<4.1E-12	<5.1E-12	<5.0E-12	<3.9E-12	5.27E-10
Total PCDF/PCDDs	**<5.8E-11**	**<6.0E-11**	**<5.7E-11**	**<5.6E-11**	5.65E-09

Enclosure

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Approval to Dispose of Polychlorinated Biphenyls (PCBs)
in the Deactivation Furnace
of the Tooele Chemical Agent Disposal Facility

COMPANY

1. Tooele Chemical Agent Disposal Facility (TOCDF)
   Tooele Army Depot
   Tooele, Utah

2. Army Office of the Program Manager
   for Chemical Munitions Disposal
   Aberdeen Proving Ground, Maryland

3. EG&G Defense Materials, Inc.
   TOCDF Office
   Tooele, Utah

APPROVAL TYPE

PCB Demonstration Test Burn for M55 VX Agent Rockets

EFFECTIVE DATE

May 1, 2002 - December 31, 2002

AUTHORITY

This approval to perform a Toxic Substances Control Act Demonstration Test Burn for PCB disposal (hereafter referred to as Demonstration Test Burn) is issued pursuant to Section 6(e) (1)of the Toxic Substances Control Act of 1976, Public Law No. 94-469, and the Federal PCB Regulations, 40 CFR Part 761.60(e), (48 Federal Register, 13185, March 30, 1983)

CONDITIONS OF APPROVAL

1. Advance Notification: A thirty-day advance notice of the Demonstration Test Burn must be provided to the Regional Administrator of EPA Region VIII and State and local officials where the TOCDF process will be operated. This notice must include the exact site, dates and description of operation of the TOCDF process along with an estimate of the duration of testing at the site.

2 . Other Permits or Approvals: Prior to commencing the Demonstration Test Burn, the Army must obtain any necessary Federal, State or local permits or approvals. During the course of the Demonstration Test Burn, the Army shall comply with all conditions and requirements of such permits or approvals.

3. Feedstock Restrictions: During the Demonstration Test Burn period, the TOCDF DFS thermal treatment process may be used by the Army to deactivate no more than 2,000 PCB-contaminated rockets, each of which may contain more than 50 mg/kg PCBs.

4. Feedstock Characterization: The Army has sampled rockets from the stockpile of M55 rockets to characterize the feedstock. The average concentration of 1,247 ppm PCBs analyzed recently from a number of rockets may be used to calculate the total PCB feed and the destruction and removal efficiency (DRE) of PCBs in the TOCDF DFS. In accordance with EPA-disposal procedures outlined in the following documents, gas chromatography must be used to determine the concentration of PCBs:

> "Guidelines for PCB Destruction Permit Applications and Demonstration Test Plans", EPA Contract No. 68-02-3938, April 16, 1985;
>
> "Quality Assurance and Quality Control Procedures for Demonstrating PCB Destruction in Filing for an EPA Disposal Permit", USEPA, June 28, 1983 (Draft);
>
> "Recommended Analytical Requirements for PCB Data Generated on Site During PCB Destruction Tests", December 12, 1985 (Draft); and
>
> "Interim Guidelines and Specifications for Preparing Quality Assurance Plans", QAMS-005-/80, Office of Research and Development, USEPA, December 29, .1980.

Authorized EPA representatives must witness this Demonstration Test Burn and obtain appropriate split samples for verification of analytical results. The Army may conduct whatever additional analyses are necessary to characterize the waste feed and facilitate more efficient incineration, i.e., chloride content, ash content and heat of combustion.

The Army may dilute existing PCBs in the waste feed or add PCBs to the waste feed in o0rder to achieve an appropriate PCB concentration for demonstration purposes.

5. EPA Laboratory Audit: EPA may provide samples of PCB5 in test matrices, such as XAD4, in order to test the adequacy of analytical methods employed by the Army or its agent. EPA will inform the Army of the approximate range of PCB concentrations and the identity of the test matrix, if such samples are provided. The Army or its agent must determine the concentration of 0PCBs, polychlorinated dibenzo-p-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs) in the test materials collected during the regular Demonstration Test Burn period, and provide EPA with all chromatograms, calculations, and records regarding the analysis. EPA personnel may observe all or any portion of the analysis procedures.

6. Process Waste Characterization: All wastes generated by the TOCDF DFS including those from the Explosives Containment Room (ECR) must be characterized. Included in the list of wastes must be the following: stack emissions, cyclone particulates, Retort discharge (bottom ash), carbon filter media from the ECR, venturi scrubber water, and packed bed scrubber water (including solids from waste water concentrator/dryer) . As a minimum, all TOCDF DFS wastes must be analyzed for PCBs, PCDDs, and PCDFs. PCDD and PCDF analytical results must include the values for the 2,3,7,8-tetrachlorinated dibenzo-p-dioxin and 2,3,7, 8-tetrachlorinated dibenzofurans congeners; total tetrachlorinated dibenzo-p-dioxins and tetrachlorinated dibenzofurans; total pentachlorinated dibenzo-p-dioxins and pentachlorinated dibenzofurans; total hexachlorinated dibenzo-p-dioxins and hexachlorinated dibenzofurans; total heptachlorinated dibenzo-p-dioxins and heptachlorinated dibenzofurans; and total polychlorinated dibenzo-p-dioxins and total polychlorinated dibenzofurans.

A. The cyclone particulates, Retort discharge (bottom ash), scrubber waters, in addition, be sampled for the following parameters:

- chemical agent
- lead, cadmium
- Toxicity Characteristic Leaching Procedure (TCLP) test for heavy metals from solid wastes generated, and for the scrubber water from the Pollution Abatement System
- total dissolved solids for the scrubber water

B. In addition, solid wastes generated in the cyclone must be characterized for the following parameters:

- trinitrotoluene (TNT) and dinitrotoluene (DNT):
  "total TNT": 2,4,6-; 3,4,6-; 3,4,5-TNT
  "total DNT": 2,4-; 2,3-;3,4-;2,5-;2,6-;3,5-DNT
- RDX (cyclotrimethylenetrinitramine)
- HMX (cyclotetramethylenetetranitramine)
- nitroglycerin

C. The TOCDF workplace air filter media must be monitored for chemical agent components.

7. Stack Emissions Monitoring: Stack emissions must be monitored for the following parameters:

- O_2, oxygen, continuous
- CO, carbon monoxide, continuous
- CO_2, carbon dioxide
- NO_x, nitrogen oxides
- HCl, hydrogen chloride
- RCl, total chlorinated hydrocarbon

- Total Particulate Matter
- PCBs, polychlorinated biphenyls
- Tetrachlorinated Dibenzo-p-dioxins
- Tetrachlorinated Dibenzofurans
- 2,3,7, 8-Tetrachlorinated Dibenzo-p-dioxins
- 2, 3, 7, 8 -Tetrachlorinated Dibenzofurans
- total pentachlorinated dibenzo-p-dioxins
- total pentachlorinated dibenzofurans
- total hexachlorinated dibenzo-p-dioxins
- total hexachlorinated dibenzofurans
- total heptachlorinated dibenzo-p-dioxins
- total heptachlorinated dibenzofurans
- total polychlorinated dibenzo-p-dioxins
- total polychlorinated dibenzofurans

The PCB analysis must include the three co-planar and seven mono-ortho co-planar PCBs listed below, along with their respective 2,3,7,8 - Tetrachlorodibenzo-p-dioxin Toxic Equivalent Factors (TEF):

PCB Congener No.	PCB Congener Chemical Designation	TEF
77	3,4,3' , 4' -tetrachlorobiphenyl	0.0005
105	2, 3, 3' , 4, 4' -pentachlorobiphenyl	0.0001
114	2,3,4,4' .5 -pentachlorobiphenyl	0.0005
118	2,3' ,4,4' , 5-pentachlorobiphenyl	0.0001
126	3,4,5,3' ,4' -pentachlorobiphenyl	0.10
156	2,3,3' ,4,4' , 5-hexachlorobiphenyl	0.0005
157	2,3,3' ,4, 4' , 5' -hexachlorobiphenyl	0.0005
167	2,3' ,4,4' ,5,5' -hexachlorobiphenyl	0.00001
169	3,4,5,3' ,4 '5' -hexachlorobiphenyl	0.01
189	2,3,3' ,4,4' ,5,5' -heptachlorobiphenyl	0.0001

DRE Calculation: Co-planar PCB congeners are counted in the total homologue (level of chlorination) count with all of the other congeners in the same homologue. They are not double counted in the DRE calculation.

Calculation of TCDD Equivalents: 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) equivalents shall be calculated for purposes of risk assessment and combustion strategy requirements. PCB congeners which are not on the list above, do not have to be included in the calculation of TCDD equivalents. A TCDD equivalent is the product of the concentration of a congener and the toxicity equivalency factor (TEF) assigned to that congener. The coplanar PCB concentrations shall be multiplied by the assigned TEFs to obtain the TCDD equivalents for the co-planar PCB congeners on the list. The resulting TCDD equivalents from PCBs will be added to the TCDD equivalents calculated from

chlorinated dibenzofurans and from chlorinated dibenzo-p-dioxins to report the total TCDD equivalents from the stack emissions. In the event that co-planar and/or mono-ortho co-planar PCB concentrations are not directly calculated, the measured concentration of most abundant congener in the homologue shall be used for the concentration to be included in the TCDD equivalent calculation. Similarly, in the event that no congener is measured in a homologue above the practical limit of quantitation (PLQ), the PLQ shall be used as the concentration for each applicable co-planar and/or mono-ortho co-planar congener in the TCDD equivalent calculation.

8. Successful Trial Runs: To satisfy the provisions of paragraphs 5 and 6, a minimum of three successful trial runs must be completed. Successful trial run is defined as one in which operations were continuous for a minimum of four hours without significant interruptions (i.e. the test has been completed on the same day initiated and the samples have been preserved and maintained intact), and one in which sampling of the stack was representative and adequate to achieve evaluation of PCB DRE to the 99.9999% level.

To calculate PCB DRE, the Army must add all PCB values quantified as well as all values detected but not quantifiable. Those values detected but not practicably quantifiable must be estimated. The maximum level estimated value shall be used. PCB levels below the detection limit shall be treated as zero values. Sampling blank values shall not be subtracted from emission values to quantify emission rates.

9. Interim Operations:

Due to the overall acute toxicits of the waste being disposed of, EPA may allow interim operations of TOCDF before any final administrative action on the draft disposal approval. TOCDF may continue operations after successfully completing the PCB Disposal Demonstration Tests at a feed rate equal to the average feed rate established during the VX Demonstration Trial Burn. To grant interim operation authorization, EPA must determine that the TOCDF DFS poses no unreasonable risk of injury to health or the environment, i.e., that it complies with the TSCA PCB incinerator standards as defined in 40 CFR 761.70.

1. For each run in the Demonstration Test Burn, the data shall demonstrate a minimum DRE for PCBs of 99.9999% and a maximum TEQ of 0.2 nanograms per dry standard cubic meter of emissions, adjusted to 7% excess oxygen.

2. The NPCD quality assurance check sample results shall report the spiked compounds within the precision and accuracy requirements stated in the procedures used for PCB analysis (modified Method 1668).

TOCDF is authorized to proceed with Phase 1, the initial five weeks of the interim operations, based on performance results submitted for the 1998 GB M55 Rocket Demonstration Trial Burn. The 1998 Trial Burn demonstrated that the GB M55 Rocket disposal operations complied with the PCB incinerator standards.

To proceed to Phase 2 requires that the DFS meets the 99.9999% destruction and removal efficiency (DRE) standards during the VX Rocket Demonstration Test Burn. In addition, TOCDF must provide for EPA acceptance, PCDD/PCDF emission data. The exhaust gas may not exceed 0.2 ng/m^3 TEQ of 2,3,7,8 tetrachlorodibenzodioxin concentration, adjusted to 7% O_2. The acceptance of the required data and authorization to proceed to Phase 2 will be verbal, followed by written confirmation by the Chief, Fibers and Organics Branch (FOB), NPCD. In addition, TOCDF must submit the following data:

1. All PCB analytical data needed to calculate the DRE.

2. All coplanar PCB analytical data, polychlorinated dibenzofurans analytical data, and all polychlorinated dibenzo-p-dioxin analytical data needed to calculate total 2,3,7, 8-tetrachlorodibenzo-p-dioxin equivalents (TEQ).

If TOCDF demonstrates that the parameters meet the criteria, then EPA will authorize verbally followed by written confirmation, an additional period of operation not to exceed five weeks. The approval shall be signed by the Chief, FOB, NPCD authorizing up to five additional weeks of interim operations.

The interim operations procedure is summarized below.

Phase	Parameters	Criteria	Authorized Duration of Interim Operations After Completion of Demonstration Tests	Cumulative Total Weeks of Interim Operations
(1)	PCB Incinerator Standards	40CFR 761.70	five weeks	five week
(2)	PCB Incineration DRE	99.9999% DRE	ten weeks	fifteen weeks
	PCDD TEF emissions	< 0.2 ng/m^3		

EPA may approve any additional time necessary to dispose of any remaining M-55 rockets containing VX nerve agent if a complete Demonstration Test Report, as determined by NPCD, is received by EPA and the report verifies an operationally successful Demonstration Test Burn.

10. Process Waste Handling and Disposal: The Army, as standard operating procedure, shall dispose of all solid waste generated during the Demonstration Test Burn from the TOCDF DFS in EPA-approved chemical waste landfills, pursuant to 40 CFR 761.75 unless verified by EPA to contain PCBs at less than 2 ppm; and water discharges shall be incinerated in EPA-approved PCB incinerators unless it can be shown that the discharge contains no detectable PCBs (for this purpose, 3 ppb) or that the discharge is controlled under an existing National Pollutant Discharge Elimination System (NPDES) permit.

11. Process Waste Disposal: All wastes generated by the TOCDF DFS process (filter media, sludge, solvent or other effluent, etc.), which have been found to contain 2 ppm or more PCBs, as calculated by comparison to an external standard homolog peak having the nearest retention time

to each appropriate PCB peak to be quantified, must be disposed of in a PCB disposal facility approved by EPA under 40 CFR Part 761.60. Analytical methods specified in the application for PCBs in different phases (water, solids and oil) must be used by the Army in making such determinations.

12. Process Restrictions: The TOCDF DFS shall operate at the following conditions whenever PCB5 are being incinerated:

A. The residence time for the afterburner combustion zone shall be a minimum two seconds, and the operating temperature shall be a minimum of 2000° F;

The dwell time of material in the Kiln Retort will be determined by the revolution of the kiln within a range from 0.5 to 2.0 rpm;

B. The stack excess oxygen shall be 3% minimum as measured in undiluted discharged combustion gas;

C. The combustion efficiency shall be a minimum of. 99.9%, computed as follows:

$$\text{combustion efficiency} = \frac{Cco_2}{Cco_2 + Cco} \times 100, \text{ where}$$

Cco_2 = concentration of carbon dioxide by volume; and
Cco = concentration of carbon monoxide by volume.

The combustion efficiency shall be recorded at least every 15 minutes from analytical data supplied from the monitoring requirements specified in Condition 6;

D. The particulate emission rate shall be less than 0.08 grains/dscf and the HC1 emissions shall be no greater than 4 lb/hr or if greater than 4 lb/hr, the removal rate shall be greater than 99%;

E. The rate and quantity of PCBs fed shall be measured and recorded at least every 15 minutes;

F The Kiln Retort and Afterburner combustion zones outlet temperature shall be continuously measured and recorded;

G Unless a contingency plan is submitted by the incinerator owner or operator and approved by the Director of the National Program Chemicals Division, and the contingency plan indicates what alternative measures the incinerator owner or operator will take if the flow of PCB feed material to the TOCDF DFS shall stop automatically, the flow of PCB feed material shall stop automatically when any one or more of the following conditions occur:

(i) Failure of the monitoring operations specified in Condition (7).

(ii) Failure of the PCB rate and quantity measuring and recording equipment estimated in Condition

(iii) Excess oxygen falls below 3% by volume;

(iv) Failure to achieve a minimum 99.9% combustion efficiency; and

(v) The incinerator outlet temperature drops below the temperature specified in Condition 11 (A).

13. Process Monitoring: Provisions must be made to assure that the following process elements are suitably monitored and recorded for each batch of PCB-contaminated M55 firing tubes processed:

A. Quantity and M55 rockets charged into the Deactivation Furnace System;

B. Quantity and PCB concentration in process waste generated (i.e., sludge, filter media, water, spent solvent or other effluent), including vent gases or other emissions;

C. Temperature and pressure of reaction in at least one half hour intervals;

D. Date, time and duration of run; and

E. Name of operator and supervisor.

13. Process Failure: If the quality control testing as described in the Demonstration Test Burn plan and the EPA guidelines reveals that the PCBs are not being adequately destroyed, disposal activities may be ordered by EPA representatives to cease until adequate explanation is given and corrective measures are taken. A written report detailing the problem and solution shall be filed with the EPA within five business days.

14. Expiration Dates: This approval shall expire on December 31, 2002.

15. Recordkeeping: The Army TOCDF shall collect and maintain for a period of five years from the date of the Demonstration Test Burn, the following information:

A. Continuous and short interval data described below:

(i) Rate and quantity of PCBs fed into the combustion system;

(ii) Temperature of the combustion operations; and

(iii) Stack emissions, including oxygen, carbon monoxide and carbon dioxide.

B. Data and records on the monitoring of stack emissions and combustion efficiency as required by these conditions;

C. The total weight in kilograms of any solid residues generated by the incineration of PCBs during the demonstration, and the total weight in kilograms of any solid residues disposed of by the facility and the location of the solids disposed;

D. The type and amount of PCB waste and other raw materials incinerated;

E. The location, manufacturer (if known), and serial number (if any) of any equipment from which PCBs were processed;

F. A copy of each gas chromatogram from the test required by Conditions 4 and 6;

G. The date(s), time and duration of the Demonstration Test Burn;

H. The name, address and telephone number of the operator and supervisor.

The documents must be compiled within 60 days following completion of the Demonstration Test Burn, must be kept at one centralized location, and must be available for inspection by authorized representatives of the EPA upon request. The Army TOCDF or its authorized agents must also maintain the records required by 40 CFR 761.180. If the Army TOCDF or its agents terminate business, these records or their copies must be submitted to the Director of the National Program Chemicals Division.

16. Safety and Health Standards: The Army TOCDF or its agents must take all necessary precautionary measures to ensure that operation of the TOCDF DFS unit is in compliance with the applicable safety and health standards, as required by Federal, State and local regulations and ordinances.

17. Facility Security: The TOCDF DFS unit shall be secured (e.g., fence, alarm system, etc.) at the test site to restrict public access to the area.

18. PCB Releases and Spills: Any spills of PCBs or other fluids shall be promptly contained and cleaned up. In addition, a written report describing the spill, operations involved, and cleanup actions must be submitted to EPA Region VIII within five (5) business days.

A written report describing the incident must be submitted by the close of business on the next regular business day. No PCBs may be processed in that facility until the release problem has been corrected to the satisfaction of EPA Region VIII.

19. Personnel Training: The Army is responsible for ensuring that personnel directly involved with t~e handling or disposal of PCB—contaminated material using the TOCDF DFS process are demonstrably familiar with the general requirements of this Demonstration Test Burn approval. At a minimum this must include:

A. The type of material which may be treated during the testing of the TOCDF DFS unit, and the upper limit of the PCB contamination which may be treated;

B. Basic reporting and recordkeeping requirements under this Demonstration Test Burn approval and the location of records at the test site;

C. Notification requirements; and

D. Waste disposal requirements for process and by-product wastes generated during the testing of the TOCDF DFS process.

In this regard, the Army must maintain the following documents on-site during the testing of its incinerator; (1) copy of this Demonstration Test Burn approval, (2) spill prevention and cleanup plan, and (3) the sampling plans to collect untreated and treated materials.

20. PCB Regulation Compliance: The Army shall comply with all applicable requirements of the Federal PCB Regulations, 40 CFR Part 761, in the operation of the TOCDF DFS unit. Particular notice should be given to:

A. 40 CFR, Section 761.65 - storage for disposal;
B. 40 CFR, Section 761.79 - decontamination; and
C. 40 CFR, Section 761.180 - records and monitoring.

21. Process Modifications: Any departure from the conditions of this Demonstration Test Burn approval or the terms expressed in the application and Demonstration Test Burn plan from the Army must receive authorization from the EPA. Verbal authorizations by EPA must be followed within ten working days by a written notification from the Army describing all modifications. In this context, "application and Demonstration Test Burn plan" shall be defined as all data and materials which have been received by this Agency from the U.S. Department of the Army regarding the TOCDF DFS destruction method.

22. Approval Modifications: EPA reserves the right to impose additional conditions when it has reason to believe that the continued operation of the TOCDF DFS decontamination/disposal process presents an unreasonable risk of injury to public health or the environment, or for any other valid cause.

23. Demonstration Test Burn Approval: Under the above conditions, and given the circumstances under which the Demonstration Test Burn will be conducted, the National Program Chemicals Division finds, pursuant to 40 CFR 761.60(e), that these tests will not present an unreasonable risk of injury to health or the environment.

Approval to perform the Demonstration Test Burn for PCB disposal is hereby granted to the Department of the Army, Tooele Chemical Agent Disposal Facility, Tooele Army Depot, Tooele, Utah; the Army Office of the Program Manager f or Chemical Demilitarization,

Aberdeen Proving Ground, Maryland and EG&G Defense Materials, Inc., TOCDF Office, Tooele, Utah subject to the conditions expressed herein, and consistent with the materials and data included in Army application "Preliminary Demonstration Test Plan, Permit Application, PCB Destruction Unit Incinerator for the Department of the Army, Tooele Army Depot, Chemical Agent Disposal Facility" July 1993., and subsequent submissions. This Demonstration Test Burn approval is valid when conducted at the Deactivation Furnace System in the TOCDF facility on the Tooele Army Depot, Tooele, Utah.

Date: 4/19/2002

David J. Kling, Acting Deputy Director
Office of Pollution Prevention and Toxics

APPENDIX I

BACKGROUND

TSCA Disposal

Section 6(e) (1) (A) of the Toxic Substances Control Act (TSCA) requires that EPA promulgate rules for the disposal of polychlorinated biphenyls (PCBs). The rules implementing section 6(e) (1) (A) were published in the Federal Register of May 31, 1979 (44 FR 31514) and recodified in the Federal Register of May 6, 1982 (47 FR 19527). Among other things, those rules require, among other things, that various types of PCBs and PCB Articles be disposed of in EPA-approved landfills (40 CFR 761.75), incinerators (40 CFR 761.70), high efficiency boilers (40 CFR 761.60), or by alternative methods (40 CFR 761.60(e)) that demonstrate a level of performance equivalent to EPA-approved incinerators or high~ efficiency boilers. The May 31, 1979 Federal Register also designated Regional Administrators as the approval authority for PCB disposal facilities.

On March 30, 1983, EPA issued a procedural rule amendment to the PCB rule (48 FR 13185). This procedural rule change transferred the review and approval authority of mobile and other PCB disposal facilities that are used in more than one region to the Office of Pesticides and Toxic Substances (OPTS). The purpose of the amendment is to eliminate duplication of effort in the regional offices and to unify the Agency's approach to PCB disposal. The amendment gives the Assistant Administrator authority to issue nationwide approvals (i.e., approvals which will be effective in all ten EPA regions) to mobile and other PCB disposal facilities that are used in more than one region. The Assistant Administrator delegated this approval authority to the Director of the Office of Pollution Prevention and Toxics (OPPT) on January 23, 1984. Approval authority has since been further delegated to the Director of the National Program Chemicals Division.

CHEMICAL AGENT DISPOSAL MANDATE

Under Congressional mandate, the Department of the Army must dispose of existing stocks of chemical warfare agent munitions. The Army intends to operate eight facilities throughout the country to dispose of chemical agents. PCBs have been found at concentrations regulated for disposal under TSCA within the M55 Agent Rocket shipping and firing tube assembly. Destruction of M55 Rocket components is performed in the Deactivation Furnace System (DFS). The DFS is one component of the demilitarization facility at the Tooele Chemical Agent Disposal Facility (TOCDF), for chemical munitions, storage containers, and the detoxification of nerve agents (GB and VX) and mustard agent (H and HD). TOCDF includes the DFS, the Dunnage Incinerator, the Liquid Incinerator (LIC) and the Metals Parts Furnace. The Army disposes of the M55 Rockets only in the DFS.

Congress enacted Public Law 100-456, September 29, 1988, National Defense Authorization Act, FY 1989, establishing the deadline of December 31, 1990 to complete the operations verification tests (OVT) at the Army Chemical Agent Disposal Systems in Johnston Atoll. In 1993, the Army completed the OVT at the Johnston Atoll Chemical Agent Disposal Systems (JACADS). The completion of the OVT at Johnston Atoll was pivotal because, by

Congressional Order, no chemical agent disposal activity may be conducted at any Army facility excepting Tooele, Utah, until the completion of the prove out effort at Johnston Atoll. The deadline for eliminating the chemical agent stockpile is December 31, 2004.

The Army submitted on July 1993, an application for TSCA PCB research and development approval (R&D) permit and an application and a Demonstration Test Burn plan for a nationwide TSCA permit to dispose of PCBs in M55 Rockets at the Tooele Chemical Disposal Facility (TOCDF). The TSCA R&D operations, the M55 GB Rockets Demonstration Test Burn, and the M55 GB Rocket disposal campaign have been completed. To complete the disposal of chemical weapons stockpile at TOCDF, the Army plans to initiate startup and shakedown of the DFS with the processing of chemical weapons containing the nerve agent VX. At the end of the shakedown, the Army intends to perform the VX Agent Demonstration Test Burn. Upon receipt of the TSCA PCB disposal approval, the Army intends to begin to the start phase to incinerate the remaining VX M55 rockets.

FINDINGS

1. In 1979, the U.S. Department of the Army initiated operations to destroy M55 rockets in the Deactivation Furnace System (DFS) of the Chemical Agent Munitions Disposal System (CAMDS) located in Tooele Army Depot, Tooele, Utah. In the fall of 1985, PCBs were identified in the firing and shipping (F/S) tubes which encase the M55 rockets.

The M55 Rocket F/S tubes consists of either chopped or matted fiberglass, depending on manufacturer, and weigh approximately 14 pounds each. The two types of tubes are readily discernable visually. Analytical results from a sample of 55 tubes revealed that the chopped variety consistently contained PCBs below 50 mg/kg (50 ppm). The matted type showed some results below 50 mg/kg PCBs; however, the majority of matted tubes contained PCBs above 2000 mg/kg with a high concentration of 4290 mg/kg. One matted tube had been painted, contained a level of 15,200 mg/kg PCB5 and was considered a statistical outlier and therefore not used by the Army in the calculation of PCB content.

Additional samples of the F/S tubes revealed that 3% of the 147 chopped tubes sampled contained PCB concentrations of over 50 ppm. The 1000 matted S/F tubes sampled exhibited a bimodal distribution with 47% of the matted tubes containing less than 50 ppm PCBs and 53% of the tubes containing PCBs concentrations of over 2700 ppm. The highest concentration of PCBs in the matted S/F tubes was found to be 5800 ppm. In 1987, the Army submitted results from a sampling program which characterized the PCB contamination of the universe of M55 shipping/firing (s/f) tubes. The s/f tubes generally possessed PCB levels in the 2000 to 4000 ppm region, averaging 2700 ppm. Analysis of samples collected recently indicate that the rocket tubes to be treated during R&D operations exhibit average levels of PCB5 of about 1,247 ppm.

2. The Deactivation Furnace System contains the Explosive Containment Room (ECR), the Retort, and the Pollution Abatement System (PAS) . Operators transport the rockets from storage, unpack and load them onto a conveyor leading to the ECR. Instruments control

operations in the ECR automatically. A punch unit pierces the rocket warheads draining and removing 95% of the chemical agent. Conveyors carry the rocket to a shearing apparatus, cutting the rocket into eight segments. The rocket pieces fall into the Retort through a sliding gate and then through a tipping valve. The sliding gate acts as a barrier to contain any deflagration or explosion. The rocket segments travel through the Retort countercurrent or opposite to flow of hot gases and exit through a heated discharge conveyor.

3. Combustion gases pass through a blast attenuation duct and flow into the Cyclone separating large particulates from the gas stream. The gases continue through a slagging afterburner and a quencher, and are then cleansed, using a venturi scrubber and a packed bed scrubber. Finally, the gases pass through a mist eliminator and discharge through the common stack.

4. The Retort is a rotary kiln with the burner located at the exit (rocket segment exit), rated at eight million BTU/hr. Fugitive emissions are controlled by operating the furnace under negative pressure. The kiln rotates at 0.5 to 2 rpm. The kiln retention time for solids is about 12 minutes, however, this varies with the rpm. The solids are heated for an additional 15 minutes in the heated discharge conveyor. The Retort and conveyor operate at a minimum temperature of 1000°F. Dimensions of the Retort are nominally 5-feet in diameter and 32 feet 10-1/2 inches long.

5. A sealed drum below the cyclone collects particulates, primarily fiberglass which flow past a gate discharge valve mechanism. The collected material is periodically analyzed for chemical agents.

6. The afterburner, with a retention time of two seconds minimum, operates at 2150°F. The quench tower reduces exhaust gases to less than 300°F while the venturi scrubber removes particulates. A single closed loop brine system serves both the quench tower and the venturi scrubber. A packed tower removes acidic gases while a controller unit in the closed loop system maintains brine pH at a level of about 8.

7. Details of the Deactivated Furnace System and the agent rockets have been filed with EPA Headquarters in Washington, D.C. in the application and Demonstration Test Burn plan for permit approval dated July 1993.

TOCDF DFS TSCA GB Demonstration Test Burn Results:

1. Rocket Feed Rate: The desired rate or set point for feeding the rockets into the DFS is 38 rockets per hour. For the three runs completed, the rocket feed rate averaged 32.5 rockets per hour.

2. Combustion Temperatures: At the burner or the solids discharge end of the Retort the average temperature was 1098.1 °F. At the exhaust side of Afterburner, the average operating temperature was 2150 °F.

3. Combustion Efficiency: The DFS met the combustion efficiency of 99.9% pursuant to

40 CFR 761.70(a)(2) for all the runs. The combustion efficiency average for the three runs was 99.99%.

4. PCB DREs: The destruction and removal efficiency (DRE) for Run 1, 2 and 3 were above the 99.9999% DRE required for PCBs at §761.70(b)(1).

5. Emissions: Stack sampling results indicate particulate emissions to be well below the existing standards of 180 mg/dscm (0.08 gr/dscf). The average for the three runs is 2.9 mg/dscm (0.0037 gr/dscf). Sampling for hydrogen chloride (HCl) indicate <0.0092 g/sec HCl in the stack gas. Other stack gas parameter averages were: (a) oxygen - 9.6%, (b) carbon monoxide - 6.0 ppm, and (c) carbon dioxide - 6.9%.

No PCDDs or PCDFs were detected in the stack samples and so the emission rate complied with the health risk assessment (HRA) level for all dioxin and furan homologues. Stack samples for energetic compounds indicated emission rate for nitroglycerin to be below the HRA level with the TNT emission rate averaging <5.3E-06 compared to the HRA level of 2.53E-06 lb/hr.

Products of incomplete combustion (PICs) include volatile and semi-volatile organic compounds. Fourteen volatile organic compounds were detected, including chlorinated and bromated compounds. Four of these compounds exceeded the HRA emission rates. Semi-volatile PICs detected in the stack gas were dimethyl phthalates, benzaldehyde, and acetophenone, however, the emission rates did not exceed the HRA emission levels for these compounds. For metals emissions, antimony, cadmium, lead, and mercury emission rates were above the HRA levels.

6. Afterburner Residence Time: The afterburner residence time for Runs 1, 2, and 3 were 3.1, 3.1, and 3.0 seconds, respectively.

7. Test Results Summary

SUMMARY OF TEST CONDITIONS AND RESULTS

Process Parameters	Units	FOB*	Test Runs No. 1	Test Runs No. 2	Test Runs No.3	Avg.	Require-ments	
DFS Temperatures	°F							
Retort Burner End (HDC Top)		1092	1098	1098	1099	1098.7	> 1000	
Afterburner Exhaust		2150	2150	2150	2150	2150	2200±150	
Combustion Efficiency	%	99.99	99.99	99.99	99.99	99.99	≥99.9	
PCBs DRE	%	NA	99.999987	99.999986	99.999984	99.999985	>99.9999	
Rocket Feed Rate Set Point	no./hr	NA	38	38	38	38		
Rocket Feed Rate	no./hr	NA	30.8	33.6	33.0	32.5		
Total Rockets Processed, Line A	rkts	NA	108	99	126			
Total Rockets Processed, Line B	rkts	NA	113	137	149			
PCB Feed Rate	kg/hr	NA	0.22	0.24	0.22			
PCB Stack Concentration	µg/dscm	0.0022	0.0020	0.0022	0.0025	0.0023		
PCB Emission Rate	gm/sec	8.2E-09	8.0E-09	8.9E-09	1.0E-08	8.97E-09	5.39E-07	(HRA)
GB Agent DRE	%	NA	99.9999975	99.9999972	99.9999977			
GB Feed Rate, Purity Corrected	lb/hr	NA	11.1	9.9	11.9			
GB Concentration	µg/m³	NA	<2.81E-03	<2.77E-03	<2.73E-03			
Particulate Conc., to 7% O_2	mg/dscm	3.0	2.4	3.8	2.4	2.9	<180	

SUMMARY OF TEST CONDITIONS AND RESULTS (cont'd)

Process Parameters	Units	FOB*	Test Runs No. 1	Test Runs No. 2	Test Runs No.3	Avg.	Require-ments	
Particulate Emission Rate	g/sec	0.0082	0.0074	0.0121	0.0082	0.0092	0.0174	(HRA)
HCl Emission	lb/hr	<0.0153	<0.0158	<0.0148	<0.0156	<0.015	<4	
HCl Emission	g/sec	<0.0019	<0.0020	<0.0019	<0.0020	<0.0020	<0.00115	(HRA)
Stack Gas Flow Rate	dscf/hr	462,780	474,240	495,660	532,620	500,840		
Oxygen	%	10.5	9.6	9.6	9.6	9.6		
Carbon dioxide	%	5.4	7.1	6.8	6.9	6.9		
Carbon Monoxide, to 7% O_2	ppm	5	6	6	6	6	<100	

*Fuel-Only Burn No. 2

PCB ANALYSIS

PCB Homologues/Congeners Per Sample

PCB, ng/sample	FOB Run	Run 1	Run 2	Run 3
Total Chlorobiphenyl		<1	<1	<1
Total Dichlorobiphenyl	2.9	1.2	3.2	4.6
Total Trichlorobiphenyl	<1	2.7	2.1	2.2
Total Tetrachlorobiphenyl	<1	<1	<1	<1
2,2',4,4'-Teterachlorobiphenyl	<1	<1	<1	<1
3,3',4,4'-Tetrachlorobiphenyl	<1	<1	<1	<1
Total Pentachlorobiphenyl	<1	<1	<1	<1
3,3',4,4',5-Pentachlorobiphenyl	<1	<1	<1	<1
Total Hexachlorobiphenyl	<1	<1	<1	<1
3,3',4,4',5,5'-Hexachlorobiphenyl	<1	<1	<1	<1
Total Heptachlorobiphenyl	<1	<1	<1	<1
Total Octochlorobipenyl	<1	<1	<1	<1
Total Nonochlorobiphenyl	<1	<1	<1	<1
Total Decachlorobiphenyl	<1	<1	<1	<1

DIOXIN/FURAN ANALYSIS

PCDD/PCDF, pg/sample	FOB Run	Run 1	Run 2	Run 3
PCDDs				
2,3,7,8-TCDD	<5.2	<5.8	<3.9	<4.1
Total TCDD	<8.2	<8.7	<8.6	<9.3
1,2,3,7,8-PeCDD	<6.0	<9.0	<5.5	<5.9
Total PeCDD	<14.0	<19	<20	<18
1,2,3,4,7,8-HxCDD	<6.3	<8.0	<6.1	<6.6
1,2,3,6,7,8-HxCDD	<5.5	<7.0	<6.1	<5.9
1,2,3,7,8,9-HxCDD	<5.6	<7.2	<5.3	<5.9
Total HxCDD	<6.3	<8.0	<5.5	<6.6
1,2,3,4,6,7,8-HpCDD	<4.8	<6.6	<4.5	<5.8
Total HpCDD	<4.8	<6.6	<4.5	<5.8
OCDD	<30	<21	<22	<20
Total PCDDs	<63	<63	<62	<59
PCDFs				
2,3,7,8-TCDF	<6.1	<6.5	<5.9	<6.6
Total TCDF	<6.1	<6.5	<5.9	<6.6
1,2,3,7,8-PeCDF	<4.3	<5.1	<4.2	<4.7
2,3,4,7,8-PeCDF	<4.4	<5.5	<4.2	<4.9
Total PeCDF	<4.4	<5.1	<4.2	<4.9
1,2,3,4,7,8-HxCDF	<2.9	<4.1	<3.2	<3.2
1,2,3,6,7,8-HxCDF	<2.9	<4.2	<3.3	<3.2
2,3,4,6,7,8-HxCDF	<3.2	<4.6	<3.6	<3.6

DIOXIN/FURAN ANALYSIS (cont'd)

PCDD/PCDF, pg/sample	FOB Run	Run 1	Run 2	Run 3
PCDFs				
1,2,3,7,8,9-HxCDF	<3.8	<5.5	<4.3	<4.2
Total HxCDF	<3.8	<5.5	<4.3	<4.2
1,2,3,4,6,7,8-HpCDF	<2.6	<2.5	<2.2	<2.6
1,2,3,4,6,7,8-HpCDF	<2.6	<2.8	<3.3	<3.7
Total HpCDF	<3.1	<3.1	<3.3	<3.7
OCDF	<6.1	<7.7	<7.6	<5.9
Total PCDFs	<24	<28	<25	<25

DIOXIN/FURAN EMISSION RATES, gm/sec

PCDDs	FOB Run	Run 1	Run2	Run 3	HRA Emission Rate
Total TCDD	<5.5E-12	<5.8E-12	<5.7E-12	<6.2E-12	5.27E-11
Total PeCDD	<9.4E-12	<1.3E-11	<1.3E-11	<1.2E-11	2.63E-10
Total HxCDD	<4.2E-12	<5.3E-12	<4.0E-12	<4.4E-12	7.19E-10
Total HpCDD	<3.2E-12	<4.4E-12	<3.0E-12	<3.8E-12	5.63E-10
OCDD	<2.0E-11	<1.4E-11	<1.5E-12	<1.3E-11	1.20E-09
PCDFs					
Total TCDF	<4.1E-12	<4.3E-12	<3.90E-12	4.4E-12	5.27E-11
Total PeCDF	<2.9E-12	<3.4E-12	<2.8E-11	<3.2E-12	5.39E-10
Total HxCDF	<2.5E-12	<3.6E-12	<2.8E-12	<2.8E-12	1.10E-09
Total HpCDF	<2.1E-12	<2.1E-12	<2.2E-12	<2.4E-12	6.35E-10
OCDF	<4.1E-12	<5.1E-12	<5.0E-12	<3.9E-12	5.27E-10
Total PCDF/PCDDs	**<5.8E-11**	**<6.0E-11**	**<5.7E-11**	**<5.6E-11**	**5.65E-09**